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MEN STARVE IN MINNESOTA

(Excerpts from a talk given by Samuel Legg)

Samuel Legg was one of a group of young conscientious objectors who volunteered to take part in the starvation experiment at the University of Minnesota from November 1944 to November 1945. Mr. Legg's first-hand report of his own experiences in the experiment gives a vivid picture of what starvation means to people.

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In November, 1944, I went out to Minnesota to take part in a nutrition experiment. Actually it was an attempt to determine the minimum basis on which large populations can be brought back from a starving situation.

It was felt that rather than pick someone who had been starving it would be better to take a group of young, healthy American boys and put them through a very rigorous starvation diet. It wouldn't have worked to take people from starvation areas because from a scientific standpoint it would have been difficult to find out how they got into this situation, and without knowing how long it had gone on and what kind of diet had gotten them into this situation it would not have been much good to medical science.

We did get every kind of psychological test it is possible to devise. In these tests we were asked what seemed to be stupid questions, personal inventories, intelligence tests, and power tests to determine our mental ability. We had all of them and took them over and over again. They probably were fairly valuable because one of the increasingly important aspects of starvation, we have found, was the psychological outlook when we were normal and measuring it again when we weren't, which produced some extremely interesting results.

Our medical examination was different, by reason of lasting instead of a few hours, three months. Every sort of equipment that the ordinary hospital has we had, and they made up some gadgets.

They took our pulse pressure and venous pressure. Pulse pressures are in various parts of the body. They had a fellow in the shop who made a "big toe pulse-ometer" and got a reading on it.

They gave us all these tests thinking that if they gave us enough tests they could determine something of a trend.

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We also had psychometer tests, in which our ability to do manual work was tested on the treadmill. We had an exhaustion test on the treadmill. It was set for 7-1/2 miles an hour. We ran 5 minutes, after which time we should have been exhausted. It was a good presumption. We were all in good shape, and only about one-third of the group could run 5 minutes. We ran the Johnson test. When you take this test your head swells, your legs ache, your lungs burn and ache and your heart is pounding, and the only thing they want is three pulse readings. They also had a moving picture ray machine which took pictures of your heart.

During the three months standardization we were on a standard American diet of 3500 calories of very good food, plenty of everything. Then came the morning when we had to go on the starvation diet. Rations were cut to 1800 calories consisting mainly of potatoes, turnip, rutabagas, macaroni, spaghetti, etc. We were encouraged and required at first to continue putting out 3500 calories a day in exercises on the treadmill or walking.

Many of our tests were in conjunction with the treadmill. Thus, with measured walks and the daily work we had to do, such as laundry and keeping quarters clean and working in the lab, we continued to put out 3500 calories, and we were taking in 1800 calories, the assumption being that if you were taking in 1500 less a day than you were putting out something would happen, and it did. Towards the end of six months of starvation we were not putting out 3500 calories a day. We tried but it was impossible.

The most obvious thing about starvation is you lose weight. How much is difficult to determine. I weight 155 now and weighed 102 last August. Fifteen to eighteen lbs. of this was fedema. Your face and legs become swollen. The water is floating around in your tissues and if you spend the day on your feet it will go to the legs. I probably weighed 85 lbs. of body matter and the other of excess fluid. Fedema comes and goes and nobody knows very much about it. It was hoped we would discover something about it in the experiment. Up until recently it has been felt that the main cause of fedema is lack of protein, but it is not now felt that is true. What does cause it nobody really knows, and it was one of the disappointing things in our experiment that we didn't find out much about it. Salt apparently does not induce fedema. When you have it you should cut down on salt because it is easier to get rid of it if you don't take salt. Fedema makes you whackier than you ordinarily are.

Our hearts shrank. They were about half the size at the end of starvation.

The entire body metabolism slows down. Mine was minus 39, and minus 10 is bad. This was probably a good thing, because if we had burned up our food at the normal rate it would have been worse. The pulse was low, blood pressure down, body temperature down -- at mid-starvation 95.6. We couldn't keep warm.

Your skin changes and you get pigmentation changes. You have light spots under your eyes and dark splotches over your cheeks. I had a few ridges in my mouth and my tongue was ridged.

My eyes were dull. I don't know whether my eyes suffered from the experiment or not but I wear glasses now and didn't before. Our eyes had no luster and the color changed.

We got water blisters on our backs and chests toward the end. They were not uncomfortable and nobody knows what they were. The hair on our arms and hands, each individual hair, split at the end.

More important than this is the physical inability to do anything. We didn't have any strength at all. We were able to walk fairly well, though. During starvation the 11 mile course which we had was dropped. We had a 7 mile course, then 3 and finally it was reduced to 1 mile down town and take a street car back. Toward the end this was really exhausting. Stairs were something, too. You hung on to the banister and hauled yourself up. Curbstones were tough, too. That weakness is all-pervading. It runs into apathy, mental as well as physical. Once you are in a chair, getting up is a major operation.

The psychological aspects of starvation are unbelievable. We went there because we were concerned about people/<sup>abroad</sup> and wanted to do what we could to help those less fortunate than ourselves, and I think we lost that feeling after about two months. I shall never again be able to read of starvation with the same detached air as I have until now. At the end of five months of starvation our attitude was "to heck with the people abroad; I am hungry." That was all that was important. The only important thing left was whether I was ever going to get food. I was only interested in myself.

We had to keep answering questions and our whole attitude was introspective. We lost our semblance of humanity and became similar to beasts. I remember seeing a guy on a corner in Minneapolis and I got mad at him because he could go and have something to eat. A couple of days later I saw a kid on a bicycle. My first thought was "how could anybody get that much energy". Then I thought "he is probably going home to supper. I hate him." That is one of the most awful things I know.

Worse than the physical discomfort of starvation is the fact that you have the thought that your mind is going to pot. I would be ashamed to tell you of some of the other reactions I had.

During standardization we were a happy and congenial lot and our meals were fun. With starvation we changed. We used to sing at our meals. The singing went in a hurry, and conversation stopped.

By the end of starvation it was a grim thing to watch 36 men, each man intent only on his plate before him. There was no sound, no communication among the men, absolute dull silence. It was a terrific change from a few months before.

When the war ended we were on the way back -- on the first month of rehabilitation. We were sitting at supper when the news came. The end of the war meant a lot to us of course. We talked about it for as long as 20 seconds and then discussion was about what we were going to eat tomorrow. News like that which was so important -- it meant a lot to us, and to think that for only 20 seconds we talked about it and that was all.

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Rehabilitation. The group was divided into four parts, eight men each. Each group was in a different caloric level of eating. The lowest at 2,000 then 2,400, 2,800 and 3,200 calories. Half of the men in the group were receiving protein supplements and half were receiving vitamins.

For example, take the lowest caloric group. Of those eight men, four were receiving proteins and four were not. Of the four receiving proteins, two were getting extra vitamins and two were not, and the same with the other groups. Rehabilitation went along for six weeks on that basis.

At the end of the six weeks not one man in the entire group had gained more than 2 lbs. and we were just as weak. It was really continued starvation. Then they raised each caloric group 800 calories a day. That made the lowest 2,800 and the highest 4,000, and we began to respond a little.

By the end of a three-month period the experiment had ended and we went home, but none of us were more than 25% rehabilitated and in any way (weight, motor ability, psychological stability, etc.)

What does <sup>all</sup> that mean?

If somebody has been starved and has gone through such an experience over a period of time, to bring him out of it, 2,000 to 2,500 calories isn't going to be enough. It will take from 1,500 to 2,000 additional calories before any improvement is going to take place and to continue 4 to 6 months before it brings him back to any level of efficiency.

Other important observations. Protein isn't perhaps as important as originally felt. Vitamins are good to help sustain a person but won't bring him back or build him up. To bring him back from starvation takes calories. Wheat or potatoes or anything, so long as he gets sufficient calories.

Our rehabilitation diet was the same as our starvation diet with few increases. Everybody knew that if you are going to have a famine area and bring relief it is going to have to be in the form of more of the same thing they have been starving on. Our experiment was based on that premise.

The protein supplements seemed to make some difference below 2,500 calories; they got along a little better. Above 2,500 calories it made no difference. As most relief feeding is carried on below 2,500 calories, protein would make some difference.

Vitamins caused no difference at any level.

It comes to this. If you are going to bring people back you must send them tremendous amounts of food. Quality of food is not as important as quantity.

Probably the main point I have to make is this sentence, "We starved at 1,800 calories."

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